

IN THE CLAIMS:

Claim 1 (currently amended): A method of inspecting a coin thrown into a machine, comprising the steps of:

(a) arranging an exciting coil and a receiving coil separately from each other in the vicinity of one side of a coin passage so that said exciting coil and said receiving coil are electromagnetically coupled with each other;

(b) exciting said exciting coil to oscillate at such a frequency that an electromotive force influenced by a reactive magnetic field caused by eddy current induced on a surface of the thrown coin when the coin passes through an electromagnetic field produced by said exciting coil is detected by said receiving coil to determine a surface pattern of the thrown coin, and detecting at least one of amplitude, frequency and phase of an oscillation voltage of said exciting coil; and

(c) discriminating authenticity of the thrown coin based on a combination of an electromotive force signal detected by said receiving coil and at least one of amplitude, frequency and phase of an oscillation voltage of said exciting coil.

Claim 2 (original): A method of inspecting a coin according to claim 1, wherein said frequency in said step (b) is preset in accordance with material of the coin to be inspected.

Claim 3 (original): A method of inspecting a coin according to claim 1, wherein said step (c) includes a step of determining material of the thrown coin based on the amplitude of the oscillation voltage of said exciting coil.

Claim 4 (previously presented): A method of inspecting a coin according to claim 1, wherein said step (c) includes the steps of sampling said electromotive force signal in a time period, and performing a statistical process based on the sampled values to determine a feature of the thrown coin.

Claim 5 (original): A method of inspecting a coin according to claim 4, wherein said statistical process includes the steps of obtaining a coefficient of correlation of said sampled values with respect to a reference coin, and discriminating the thrown coin based on magnitude of said correlation coefficient.

Claim 6 (currently amended): A method of inspecting a coin thrown into a machine, comprising the steps of:

(a) arranging an exciting coil in the vicinity of one side of a coin passage inclined at a predetermined angle so that magnetic poles thereof face the coin passage;

(b) arranging two receiving coils with substantially identical characteristics in the vicinity of said one side of said coin passage but separately from said exciting coil so that said receiving coils are electromagnetically coupled with said exciting coil;

(c) exciting said exciting coil at a predetermined frequency to produce an electromagnetic field, and detecting at least one of amplitude, frequency and phase of electromagnetic field of said exciting coil; and

(d) discriminating authenticity of the thrown coin based on a combination of an electromotive force signal influenced by a reactive magnetic field caused by eddy current induced on a surface of the thrown coin and detected by said two receiving coils and at least one of amplitude, frequency and phase of an oscillation voltage of said exciting coil.

Claim 7 (original): A method of inspecting a coin according to claim 6, wherein said frequency in said step (c) is preset in accordance with material of the coin to be inspected.

Claim 8 (original): A method of inspecting a coin according to claim 6, wherein said step (d) includes a step of determining material of the thrown coin based on the amplitude of the oscillation voltage of said exciting coil.

Claim 9 (previously presented): A method of inspecting a coin according to claim 6, wherein said step (d) includes the steps of sampling said electromotive force signal in a time period, and performing a statistical process based on the sampled values to determine a feature of the thrown coin.

Claim 10 (original): A method of inspecting a coin according to claim 9, wherein said statistical process includes the steps of obtaining a coefficient of correlation of said sampled values with respect to a reference coin, and discriminating the coin based on magnitude of said correlation coefficient.

Claim 11 (currently amended): An apparatus for inspecting a coin thrown into a machine, comprising:

an exciting coil arranged in the vicinity of one side of a coin passage;

a receiving coil arranged separately from said exciting coil in the vicinity of said one side of said coin passage so as to be electromagnetically coupled with said exciting coil;

oscillation means for exciting and oscillating said exciting coil at a predetermined frequency to produce an electromagnetic field;

first detecting means for detecting at least one of amplitude, frequency and phase of an oscillation voltage of said exciting coil;

second detecting means for detecting an electromotive force signal influenced by a reactive magnetic field caused by eddy currents induced on a surface of the thrown coin when the coin passes through said electromagnetic field produced by said exciting coil and which is generated in said receiving coil; and

discriminating means for discriminating authenticity of the thrown coin based on detection outputs from said first and second detecting means;

whereby authenticity of the thrown coin is discriminated based on a combination of an electromotive force signal detected by said receiving coil to determine a surface pattern of the thrown coin and at least one of amplitude, frequency and phase of the oscillation voltage of said exciting coil.

Claim 12 (original): An apparatus for inspecting a coin according to claim 11, wherein said predetermined frequency is set in accordance with material of the coin to be discriminated.

Claim 13 (original): An apparatus for inspecting a coin according to claim 11, wherein said discriminating means determines material of the thrown coin based on the amplitude of the oscillation voltage of said exciting coil.

Claim 14 (previously presented): An apparatus for inspecting a coin according to claim 11, wherein said discriminating means samples said electromotive force signal in a time period, and performs a statistical process based on the sampled values to determine a feature of the thrown coin.

Claim 15 (original): An apparatus for inspecting a coin according to claim 14, wherein said statistical process is performed by obtaining a coefficient of correlation of said sampled values with respect to a reference coin, and discriminating the thrown coin based on magnitude of said correlation coefficient.

Claim 16 (currently amended): An apparatus for inspecting a coin thrown into a machine, comprising:

an exciting coil arranged in the vicinity of one side of a coin passage inclined at a predetermined angle so that magnetic poles thereof face the coin passage;

two receiving coils having substantially identical characteristics and arranged separately from said exciting coil in the vicinity of said one side of said coin passage so that said receiving coils are electromagnetically coupled with said exciting coil;

oscillation means for exciting and oscillating said exciting coil at a predetermined frequency to produce an electromagnetic field;

first detecting means for detecting at least one of amplitude, frequency and phase of an oscillation voltage of said exciting coil;

second detecting means for detecting an electromotive force signal influenced by a reactive magnetic field caused by eddy currents induced on a surface of the thrown coin when the coin passes through said electromagnetic field and which is generated in said two receiving coils; and

discriminating means for discriminating authenticity of the thrown coin based on detection outputs from said first and second detecting means; and

whereby authenticity of the thrown coin is discriminated based on a combination of an electromotive force signal detected by said receiving coil to determine a surface pattern of the thrown coin and at least one of amplitude, frequency and phase of the oscillation voltage of said exciting coils.

Claim 17 (original): An apparatus for inspecting a coin according to claim 16, wherein said first detecting means includes a first detector circuit for outputting a direct voltage signal corresponding to the oscillation voltage of said exciting coil.

Claim 18 (original): An apparatus for inspecting a coin according to claim 16, wherein said second detecting means comprises a bridge circuit including said two receiving coils, a differential amplifier circuit for amplifying an alternating voltage signal outputted from said bridge circuit and outputting the amplified signal, and a second detector circuit for detecting and rectifying the alternating voltage signal from said differential amplifier circuit and converting the same into a direct voltage signal corresponding to the output of said bridge circuit.

Claim 19 (original): An apparatus for inspecting a coin according to claim 16, wherein said predetermined frequency is set in accordance with material of the coin to be inspected.

Claim 20 (original): An apparatus for inspecting a coin according to claim 16, wherein said discriminating means discriminates material of the thrown coin based on the amplitude of the oscillation voltage of said exciting coil.

Claim 21 (original): An apparatus for inspecting a coin according to claim 16, wherein said exciting coil is arranged at a predetermined distance from said receiving coils so that a line connecting centers of magnetic poles of said exciting coil is substantially parallel with an extending direction of said coin passage, and said two receiving coils are arranged above a coin rail provided with said coin passage so that a line connecting centers of said two receiving coils is substantially parallel with an extending direction of said coin passage.

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Claim 22 (original): An apparatus for inspecting a coin according to claim 16, wherein said exciting coil is arranged at a predetermined distance from said receiving coils so that a line connecting centers of magnetic poles of said exciting coil is substantially perpendicular to an extending direction of said coin passage, and said two receiving coils are arranged above a coin rail provided with said coin passage so that a line connecting centers of said two receiving coils is substantially parallel with an extending direction of said coin passage.

Claim 23 (original): An apparatus for inspecting a coin according to claim 16, wherein said exciting coil is arranged at a predetermined distance from said receiving coils so that a line connecting centers of magnetic poles of said exciting coil is substantially parallel with an extending direction of said coin passage, and said two receiving coils are arranged above a coin rail provided with said coin passage so that a line connecting centers of said two receiving coils is substantially perpendicular to an extending direction of said coin passage.

Claim 24 (original): An apparatus for inspecting a coin according to claim 16, wherein said coin passage is formed so that a coin passing therethrough is inclined to said one side of said coin passage where said exciting coil and said receiving coils are arranged.

Claim 25 (previously presented): An apparatus for inspecting a coin according to claim 16, wherein said discriminating means samples said electromotive force signal in a time period, and performs a statistical process based on the sampled values to determine a feature of the thrown coin.

Claim 26 (original): An apparatus for inspecting a coin according to claim 21, wherein said statistical process is performed by obtaining a coefficient of correlation of said sampled values with respect to a reference coin, and discriminating the coin based on magnitude of said correlation coefficient.

Claim 27 (currently amended): An apparatus for inspecting a coin thrown into a machine, comprising:

an exciting coil arranged in the vicinity of one side of a coin passage inclined at a predetermined angle so that two magnetic poles thereof face the coin passage;

two receiving coils having substantially identical characteristics and arranged separately from said exciting coil in the vicinity of said one side of said coin passage so that said receiving coils are electromagnetically coupled with said exciting coil;

oscillation circuit means arranged with said exciting coil as an oscillation element;

first detector circuit means coupled to said oscillation circuit means for detecting at least one of amplitude, phase and frequency of an oscillation voltage in said exciting coil;

bridge circuit means arranged to include said receiving coils;

differential amplifier means connected to said bridge circuit means;

second detector circuit means for detecting an electromotive force signal influenced by a reactive magnetic field caused by eddy currents induced on a surface of the thrown coin an output of said second detector circuit means being connected to said differential amplifier means; and

discriminating means connected to said first and second detector circuit means to discriminate a feature of said thrown coin based upon a combination of an output of said second detector circuit means to determine a surface pattern of the thrown coin and an output of said first detector circuit means to determine at least one of amplitude, phase and frequency of said oscillation voltage, and output a result of the discrimination.